

CLAIMS:

1 1. A method of selecting components for total hip arthroplasty during per-
2 formance of an operation, comprising:

3 A. establishing a pelvic and a femoral reference coordinate system from a single
4 fluoroscopic image;

5 B. determining the position of a femoral broach by means of a surgical navigatio-
6 system;

7 C. during the operation, using data obtained from said navigation sys-
8 tem, selecting femoral head and neck components to satisfy defined pa-
9 rametric constraints with respect to at least one of leg length, offset, and
10 range of motion.

1 2. A method of defining a femoral coordinate system, comprising the steps of:

2 A. defining a femoral shaft axis;

3 B. with the knee bent at approximately 90 degrees relative to the femur, defin-
4 ing a lower leg axis;

5 C. computing the intersection of a first plane perpendicular to the femoral shaft
6 axis and the lower leg axis; and

7 D. establishing a coordinate system based on said femoral shaft axis, said lower
8 leg axis, and said intersection.

1 3. A method according to claim 2 in which said femoral shaft axis, said lower
2 leg axis, and said intersection themselves form the axes of said coordinate system.

1 4. A method of determining the axial rotation of a pelvis from a single fluoro-
2 scopic image, comprising

3 A. forming a fluoroscopic image of said pelvis in the near AP direction;

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- 4 B. defining first and second landmarks of said pelvis on said image, said land-
5 marks separated from each other in at least an anterior-posterior direction;
- 6 C. determining the transaxial displacement of said landmarks on said image;
- 7 D. using said displacement as a measure of the axial rotation of said pelvis with
8 respect to the plane of said fluoroscopic image.
- 1 5. A method according to claim 4 in which said first landmark comprises the
2 image point of the pubic symphysis.
- 1 6. A method according to claim 5 in which said second landmark comprises the
2 midpoint of a line between the image points of the left and right sacroiliac joints.
- 1 7. A method according to claim 4 in which said displacement is normalized
2 with respect to the separation between a further pair of landmarks.
- 1 8. A method according to claim 7 in which said further pair of landmarks com-
2 prises the left and right teardrops.
- 1 9. A method of determining the transaxial rotation of a pelvis from a single
2 fluoroscopic image, comprising
- 3 A. forming a fluoroscopic image of said pelvis in the near AP direction;
- 4 B. defining first and second landmarks of said pelvis on said image, said land-
5 marks separated from each other in at least an anterior-posterior direction;
- 6 C. determining the axial displacement of said landmarks on said image;
- 7 D. using said displacement as a measure of the transaxial rotation of said pelvis
8 with respect to the plane of said fluoroscopic image.
- 1 10. A method according to claim 9 in which said first landmark comprises the
2 image point of the pubic symphysis.
- 1 11. A method according to claim 10 in which said second landmark comprises
2 the midpoint of a line between the image points of the left and right sacroiliac joints.

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1 12. A method according to claim 11 in which said displacement is normalized
2 with respect to the separation between a further pair of landmarks.

1 13. A method according to claim 12 in which said further pair of landmarks
2 comprises the left and right teardrops.

1 14. A method according to claim 12 in which the transaxial rotation is taken as
2 a function of the relation of said displacement to the corresponding displacements on
3 the fluoroscopic images of a sample of pelvises taken at known orientation to the
4 fluoroscopic image plane.

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